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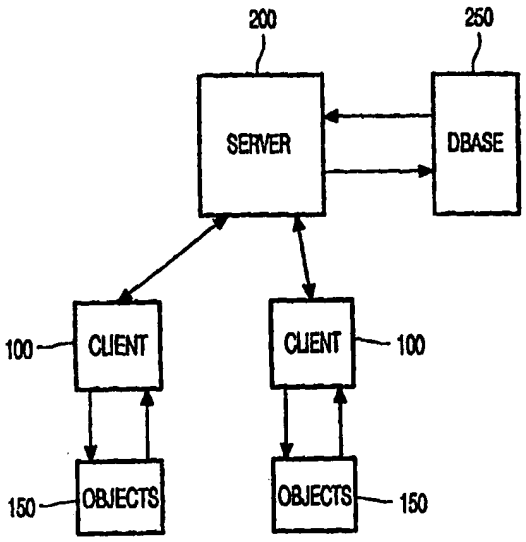


(57) Abstract

A method and apparatus for the generation of graphic paging messages for passing between remote data communications devices (100). A device constructs a graphic message using one or more locally stored (150) image component objects, and then codes the message as an ordered list of such component objects and their relative positions within a fixed coordinate image field. A server (200) handles the passing of messages from one device (100) to another, as well as storing such messages when a device is unavailable. The server (200) also maintains or provides access to a library (250) of object components accessible by each user device and from which further component objects may be selected to augment those from which a user composes graphic images for transmission.

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DESCRIPTION

# GRAPHIC IMAGE MESSAGE GENERATION

The present invention relates to the formation and transmission of graphic images and particularly, but not exclusively, to the sending of graphic objects as all or part of a message between users of hand-held or mobile communications devices.

The majority of the current generation of hand-held mobile devices are driven by text-based user interfaces and deliver text-only messages in paging and similar operations. Through these interfaces, the user is enabled to browse the handsets range of functionality and select and perform the required tasks. Such mobile devices can also exchange information using protocols such as the Short Message Service (SMS) part of the Global System for Mobile communications (GSM) digital standard. These text based displays have a limited capability and lack the flexibility of display and appeal of graphical information. Increasingly there is a desire to incorporate graphical information to improve both the user interface and the exchange of information.

An example of a mobile messaging system seeking to improve the ready understandability of messages through the use of displayed graphic icons to represent or support a message is described in International patent application WO97/19429 (Motorola/Deluca et al). In the mobile telephone receiver described, a graphics database holds image data for a number of predetermined images, each identified by a respective (and standardised) code. On receipt of a paging message from another user, the handset processor scans the message firstly to identify whether it contains the code or codes for one or two of the images stored in the graphics database and, on finding these, it generates these images on a display screen of the handset. Secondly, it scans the message for any character string data which, if found, will be converted to a text message and displayed on screen below the image or

images.

Whilst this arrangement can add to the appeal and understandability of the paging message, its flexibility is limited by the need for the image data to be pre-loaded to the handset: although various techniques are described for updating the handset's graphic database, from manual data entry through to over-the-air downloading of graphics data files, the problem remains that the identity of each of this finite set of images must be standardised - at the very least between pairs of users who intend to utilise the service.

It is, therefore, an object of the present invention to provide improved flexibility in the provision of graphics images to be displayed on the screens of hand-held or mobile apparatus, which images may represent the whole or part of a message.

It is a further object to provide a communications apparatus configured to generate such graphic images.

In accordance with a first aspect of the present invention there is provided a method for the generation of paging messages for passing between remote data communications apparatuses, wherein the message generating apparatus constructs a coded message including specification of one or more graphic message elements and transmits the coded message via a server to the message receiving apparatus which decodes and displays the message;

characterised in that the message generating apparatus constructs the graphic message elements from one or more locally stored image component objects, codes the message as an ordered list of such component objects and their relative positions within an image field which image field is recreated based on stored protocols for handling such objects within the message receiving apparatus. By making use of an internal store of component objects from which a customised image may be constructed, a much greater range of possible graphic messages is possible and, with the receiver apparatus handling the relatively simple protocols for recreating objects (as opposed to whole images) neither the processing load at the receiver, nor the bandwidth for image data,

are excessive.

In order to expand the devices component store, the said server may maintain a database of image component objects, with the message generating apparatus being enabled to access said database, download via communications link data defining a selected one or more image component objects, and store the same. The selection and downloading may be wholly or partly under the direction of the user of the sender device, with the server perhaps presenting menus of available objects. To avoid the need for further telecommunications protocol specification to support the service, communications between said apparatuses and via the server may suitably conform to GSM protocols with the sending of coded graphic data utilising the above-mentioned SMS function of GSM: it is a particular feature that the graphic message data should be extremely compact, as will be discussed hereinafter.

Also in accordance with the present invention there is provided a portable communications apparatus for use as a message generating apparatus in the above-recited method, the apparatus comprising: a first memory comprising a store of component objects; a display device controllably operable to display one or more component objects recalled from the first memory; user operable control means for selecting and manipulating displayed component objects; encoding means for generating a coded specification of said selected and manipulated component objects; and transmitter means for formatting and sending, via a server, a paging message including said coded specification.

The encoding means may be arranged to generate an ordered rendering list identifying the order in which the selected component objects are to be rendered on regeneration of the image, and to sequentially code each object of the list as a first data word identifying the object type and one or more further words specifying coordinates for said object. The apparatus may further comprise a receiver coupled with the said first memory and configured to receive coded image data from the server, and further storage means coupled with the display and containing said object identifier codes, the display being

configured to reconstruct the image from the object data and output the same.

The control means may comprise a touch screen overlaying the display, in which arrangement the control means may suitably be configured to monitor and store component objects specified by user input in the form of entry via the touch screen. With this feature, the freehand drawing of component objects by the user may be supported, such as to enhance the personalised nature of messages and increase the variety of possible graphic images. Alternately, or additionally, where the device has a number of existing user operable controls, the said input means may be provided as selectable secondary functions of one or more of those user operable controls.

Thus the present invention provides a means for exchanging graphical images for display in a format optimised for low bit-rate mobile data communications. The method allows objects to be displayed in a device independent manner on low to medium resolution graphical displays such as those of mobile telephones or PDA's.

Preferred embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawings in which:

Figure 1 is a block schematic diagram of a messaging system embodying the present invention;

Figure 2 is an example component object image formed from seven objects;

Figure 3 is a table of the respective properties of each of the objects in the image of Figure 1;

Figure 4 represents the bit-structure of a command word identifying an object;

Figure 5 represents the bit-structure of an object coordinate specification; and

Figure 6 is a block schematic diagram of a receiver apparatus suitable to embody the present invention.

Figure 1 generally illustrates a messaging system which may suitably embody the present invention, comprising a number of client personal communications devices 100 exchanging messages using the SMS part of the GSM digital standard via a server 200. If a client is unreachable, then a message will be stored at the server 200 and sent later as the target client becomes available. The present graphic messaging system sits on top of the existing SMS infrastructure; SMS allows short textual messages to be sent between telecommunications devices, with messages being entered by typing on the devices keypad, and the applicants have recognised that this may be extended to support the sending of suitably formatted graphic image data.

In general operation, a client device 100 provides the user with means in the form of a simple graphics editor to assemble graphic images from one or more component objects (which objects may include text strings), as will be described, with the device maintaining an internal store 150 of such component objects. Preferably, in a basic mobile telephone application, all interactions or object manipulations specified by the user are performed by the standard telephone keys: for example, the user could use the 4 and 6 numeric keys to move a selected object left or right, and the 8 and 2 keys to move up or down.

In order to enhance the number of component objects available to a user composing an image, the server 200 may maintain or provide direct access to a library 250 of additional objects. Using either SMS or a GSM data channel, the user can browse a hierarchical menu of images and select one for downloading to the users device. Alternatively, or additionally, by use of the same numeric keys for object manipulation, the user may be enabled to "draw" freehand. In a further extension to this, where the user device features a touch-screen user input, direct drawing of component objects by use of a stylus and the screen may be accommodated.

In order to permit the direct transmission of graphic images to the client devices, a component object specification is used which describes an image by the objects comprising it (lines, polygons, points/circles etc.): a particularly

suited coding specification is described briefly below and in greater detail in the commonly-assigned United Kingdom patent application 9800900.4 entitled "Graphic Image Generation and Coding", filed 17th January 1998.

Component object images as used in the following examples are comprised of three main drawing objects: points, text, and polygons; a polygon may have between one and nine edges and, assuming a monochrome or two-colour display, may be filled or unfilled. Each object can be drawn in either "black" (with pixels set) or white (pixels are cleared). Figure 2 shows an example component object image 10 constructed from a total of seven objects 11-17. Note that it is possible to overlay objects on top of each other; objects are drawn in the order in which they are specified in the encoded data stream and the encoded data therefore represents an ordered list of display objects. The properties of each object in the example image of Figure 2 are as shown in the table of Figure 3. Because object 14 (a white filled polygon) was drawn after object 13 (black filled polygon) it appears on top of the arrow-shaped polygon 13. Likewise the text string (object 15) appears on top of the white filled polygon 14.

All vertices in component object images are specified in a fixed coordinate image field using the XY coordinate system shown in Figure 1, with the origin in the top left hand corner and a range 0-127 for each axis. Although the image field is "square" (the ranges for the X and Y axes are the same), the display device is unlikely to be. The image will be scaled in the terminal to fit the display size and aspect ratio.

The encoding of component object data is intended to be particularly compact: every object to be drawn is sent a command word followed by a variable length of data. The data may be characters (7-bit ASCII) or coordinates (14-bits). The commands are formatted as 7-bit words of data. The overall bit format is as shown in Figure 4, with all data being encoded in the order of most-significant to least significant bit. The first bit, c, is the colour bit and indicates whether the object perimeter line is to be drawn in the background colour ("white"; c=0) or the foreground colour ("black"; c=1). The next two bits, CC,

indicate the type of object (point, text, filled or unfilled polygon), following which is one bit, s, indicating whether or not object may be selected at the device of a receiving user (0=no; 1=yes), then three bits, ppp, to specify a parameter value of 0-7. Commands may be followed by coordinates in terms of the image field and formatted as shown in Figure 5, with the first seven bits giving a value 0-127 for the X coordinate, and the other seven bits giving a value 0-127 for the Y coordinate.

A block schematic diagram of a mobile/hand-held communications device configured both to receive and generate component object encoded messages is shown in Figure 6. The functioning of many of the component parts will be well understood by the skilled reader and, other than in terms of their bearing on the operation of the present invention, they will not be described in detail.

From an aerial 20 or other signal input, a received signal is passed via transceiver 22 and decoder 24 stages to a central processing unit 26, which unit also (in this embodiment) handles the function of display driver formatting graphical and text data into display commands for output to display screen 28. An apparatus memory 30 is coupled with the processor and holds basic operating data and programs for the device. User input to the processor 26 is via controls 32: these may be in the form of a simple keypad and/or they may be combined with the display 28 through a touch-screen arrangement, as indicated by dashed line 34. Other conventional functions of the device (for example audio handling) are illustrated generally at 36.

Coupled with the processor 26 is a further store 38 containing a collection of component objects as well as the command word codes (referred to above) to enable the processor/display driver 26 to interpret received command words and recreate the encoded image: this memory may also hold a table of ASCII codes for text strings. Also coupled with the processor 26 is a scaling stage 40 which may comprise a simple hardware arrangement of multipliers to convert the image field coordinates in a received data stream to fit the available area and aspect ratio of the display device 28. Finally, output signals from the

processor 26 such as speech messages, indications of object selections, access messages to the server library of additional component objects, or new graphic images generated on the device as described previously are sent via encoder 42 to the transceiver 22 for sending to the server (200; Fig.1).

As will be recognised, many variations are possible on the arrangement of Figure 6. For example, the object and command word code store 38 may be incorporated with the general device memory 30. Also, the decoder 24/encoder 42 and/or scaling circuit 40 functions may be embodied completely in software and carried out in processor 26. Alternatively or additionally, the display driver functions of the processor may be handled by a separate unit, optionally with a display memory from which display data would be read out.

From the foregoing, it will be seen that we have provided a mechanism whereby objects may be coded in a format optimised for low bit-rate mobile data communications. The coding scheme allows objects to be mapped to relative screen coordinates enabling the images to be rendered in a device-independent manner. Additionally, since the objects are given a separate identity in the coding scheme, they may also be separately highlighted and selected on the screen. Information regarding which object is selected may be communicated back to the originator enabling navigation and interactive displays.

From reading the present disclosure, other modifications will be apparent to persons skilled in the art. Such modifications may involve other features which are already known in the design, manufacture and use of image coding equipment and component parts thereof and which may be used instead of or in addition to features already described herein. Although claims have been formulated in this application to particular combinations of features, it should be understood that the scope of the disclosure of the present invention also includes any novel feature or any novel combination of features disclosed herein either explicitly or implicitly or any generalisation thereof, whether or not it relates to the same invention as presently claimed in any claim and whether or not it mitigates any or all of the same technical problems as does the present invention. The applicants hereby give notice that new claims may be

formulated to such features and/or combinations of features during the prosecution of the present application or of any further application derived therefrom.

CLAIMS

1. A method for the generation of paging messages for passing between remote data communications apparatuses, wherein the message generating apparatus constructs a coded message including specification of one or more graphic message elements and transmits the coded message via a server to the message receiving apparatus which decodes and displays the message;

characterised in that the message generating apparatus constructs the graphic message elements from one or more locally stored image component objects, codes the message as an ordered list of such component objects and their relative positions within an image field which image field is recreated based on stored protocols for handling such objects within the message receiving apparatus.

2. A method as claimed in Claim 1, wherein the said server maintains a database of image component objects, and the message generating apparatus is enabled to access said database, download via communications link data defining a selected one or more image component objects, and store the same.

3. A method as claimed in Claim 1 or 2, wherein communications between said apparatuses and via the server conform to GSM protocols and the sending of coded graphic data utilises the SMS function of GSM.

4. A portable communications apparatus for use as a message generating apparatus in the method of Claim 1, the apparatus comprising:

a first memory comprising a store of component objects;

a display device controllably operable to display one or more component objects recalled from the first memory;

user operable control means for selecting and manipulating displayed

component objects;

encoding means for generating a coded specification of said selected and manipulated component objects; and

transmitter means for formatting and sending, via a server, a paging message including said coded specification.

5. Apparatus as claimed in Claim 4, wherein said encoding means is arranged to generate an ordered rendering list identifying the order in which the selected component objects are to be rendered on regeneration of the image, and to sequentially code each object of the list as a first data word identifying the object type and one or more further words specifying coordinates for said object.

6. Apparatus as claimed in Claim 5, further comprising a receiver coupled with said first memory and configured to receive coded image data from the server, and further storage means coupled with said display and containing said object identifier codes, said display being configured to reconstruct the image from the object data and output the same.

7. Apparatus as claimed in Claim 4, wherein said control means comprises a touch screen overlaying said display.

8. Apparatus as claimed in Claim 7, wherein said control means is configured to monitor and store component objects specified by user input in the form of entry via the touch screen.

9. Apparatus as claimed in Claim 4, further comprising a plurality of user operable controls wherein said input means are provided as selectable secondary functions of said user operable controls.

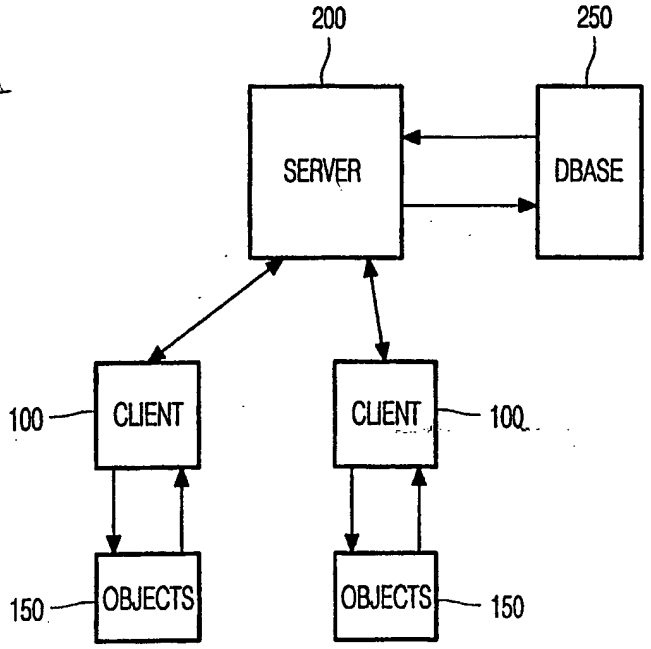

200
250
SERVER
DBASE
100
CLIENT
CLIENT
100
150
OBJECTS
OBJECTS
150

FIG. 1

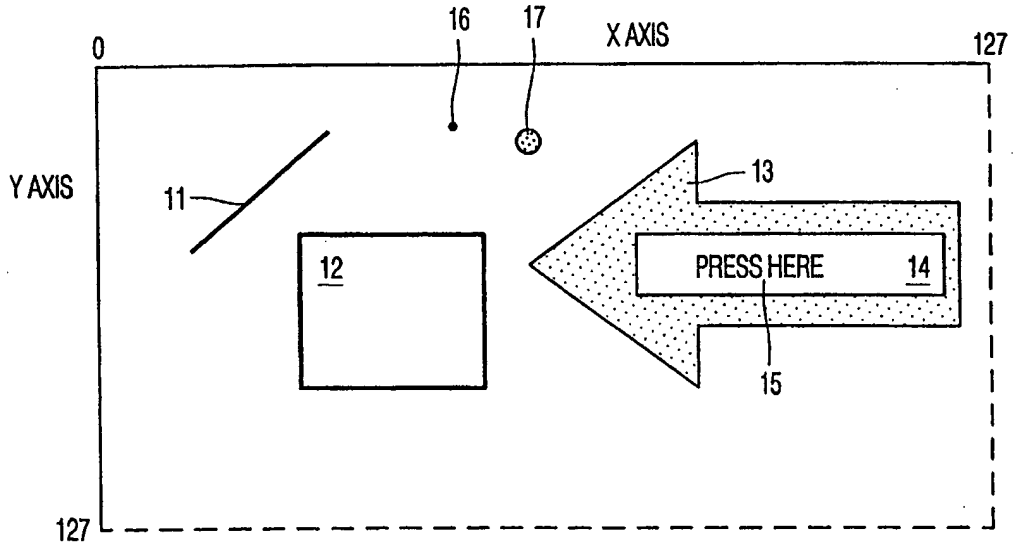

16
17
X AXIS
0
127
Y AXIS
11
12
13
PRESS HERE
14
15
127

FIG. 2

| Object | Type |
|---|---|
| 11 | Black unfilled polygon, with 1 edge. |
| 12 | Black unfilled polygon, 4 edges. |
| 13 | Black filled polygon, 7 edges. |
| 14 | White filled polygon, 4 edges. |
| 15 | Black text string. |
| 16 | Black point, radius 1 |
| 17 | Black point, radius 4. |

FIG. 3

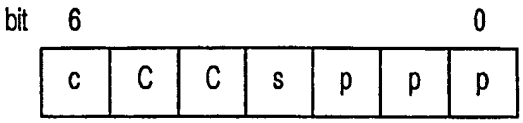



FIG. 4

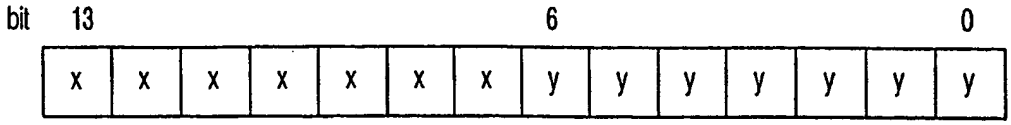
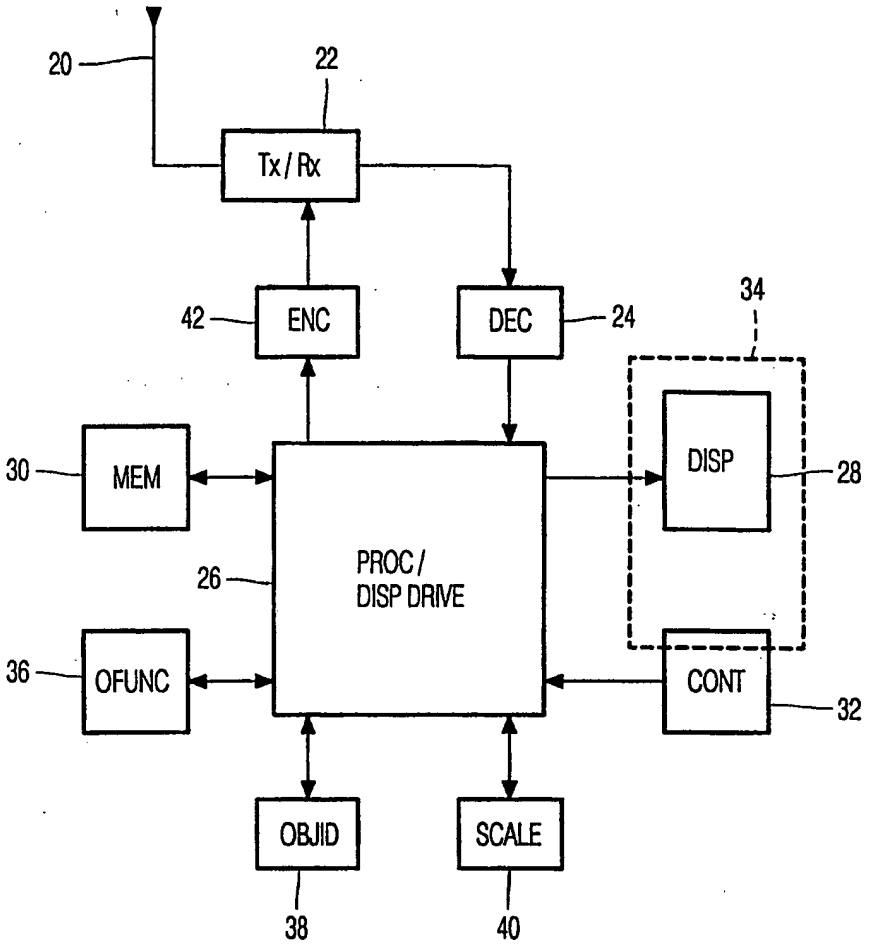



FIG. 5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22
Tx / Rx
42
ENC
DEC
24
34
30
MEM
DISP
28
PROC /
DISP DRIVE
26
36
OFUNC
CONT
32
OBJID
SCALE
38
40

FIG. 6